

# SOLAR

## Photovoltaic Technology

Photovoltaic (PV) Systems are used to convert energy from the sun into electricity. They are safe and reliable source of solar electricity that produces no on-site pollution or emissions. PV systems incur fewer operating costs and can be installed on any kind of building such as:



Residential Commercial Industries Institutional

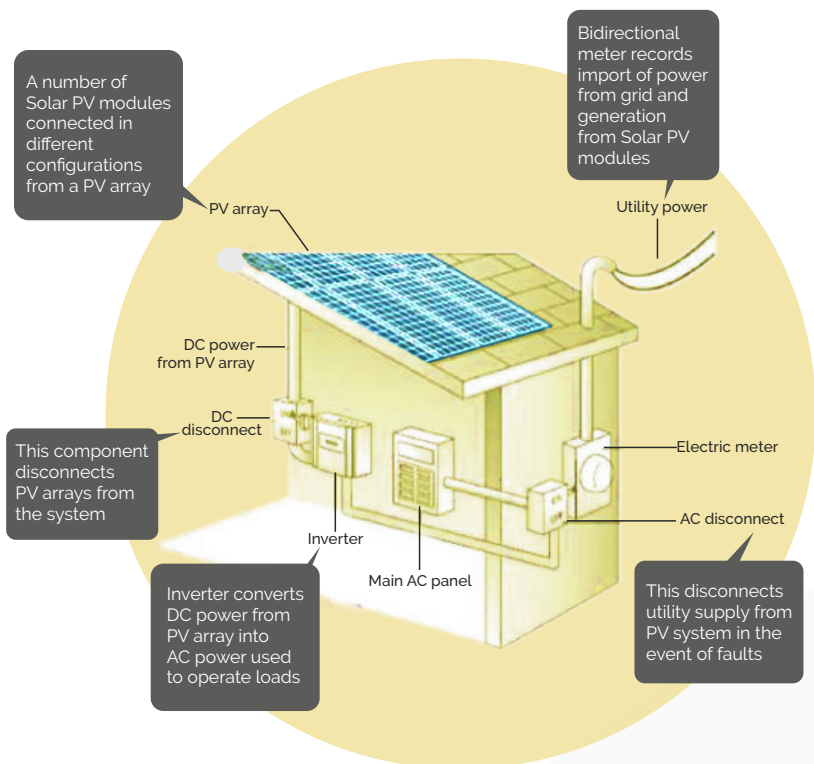
PV system falls into two main categories grid-connected and off-grid.

### Grid-tied systems

- System is connected with local electricity distribution grid; energy generated is sent into the utility grid.
- A credit for the energy generated is provided generated.
- Grid acts as energy storage unit.

### Off-grid systems

- System is independent of the local electricity distribution grid.
- Energy generated is either consumed in real-time or stored in batteries.



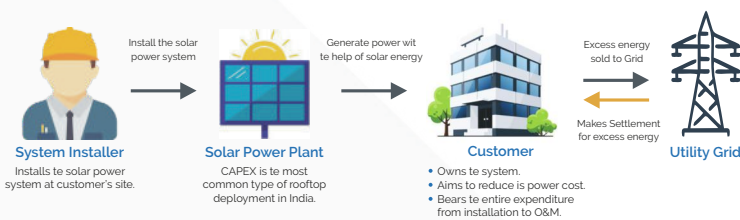
### Solar PV Application and Potential End Use

Output energy	Application	Suitable Building type	Specific requirement
Electricity	Offset Building electricity consumption & Export to Grid	Suitable for all building types	Shadow free area (rooftop or ground)

# Business Models for Rooftop Solar: CapEx, OpEx (RESCO) & Leasing Model

CAPEX (CAPITAL EXPENDITURE MODEL) CAPEX is the most common form of solar power plant business model in India. In this model consumer generally hire a solar EPC company who provide turnkey installation of entire solar power system and hand over assets to consumers.

- Allows residential, industrial and commercial customer to own the system.
- The customer sets up rooftop solar project with the intent to reduce his own power costs.
- The customer bears the entire capital expenditure of the project.
- Customer gets benefit by selling the surplus power generated to the DISCOM.
- The gains from tariff savings accrue to the roof and solar power plant owner.
- Commercial & institutional clients can also claim the accelerated depreciation.
- EPC also performs annual operation and maintained (O&M) of plant on mutually agreed cost per annum.

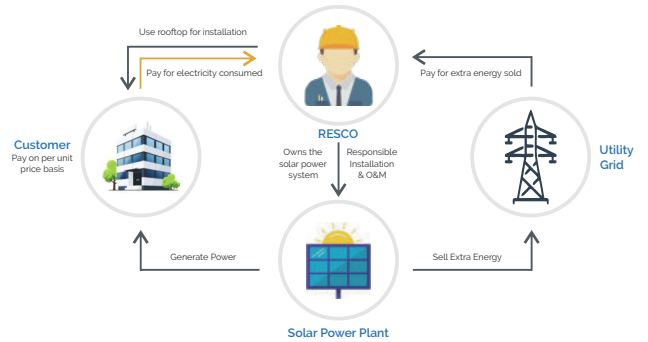


## RESCO (RENEWABLE ENERGY SERVICE COMPANY)

A Renewable Energy Service Company (RESCO) is an ESCO Energy service company which provides energy to the consumers from renewable energy sources, usually solar photovoltaics, wind power or micro hydro. RESCO or BOOT model is about pay as you consume the electricity.

- Solar Power Plant is owned by the RESCO or ENERCO (Energy Company).
- The customer serviced does not own the Solar Power Plant.
- Customer have to sign a Power purchase Agreement (PPA) with actual investor at mutually agreed tariff and tenure.

- Customer only pays for electricity consumed on a per unit price for power basis.
- RESCO developer is responsible for its annual operations & maintenance (O&M).
- The RESCO gets the benefit by selling the surplus power generated to the DISCOM.



## LEASING MODEL

Under the solar leasing business model, usually the leasing company installs and maintains the system on the customer's roof. The homeowner agrees to buy power from the leasing company at a pre-determined rate for a period of around 20-25 years. The rates may come with periodic escalators or maybe fixed in nature. The homeowner requires the right kind of roof and needs to be in a favorable locality. The leasing company would agree to install a system only if these prerequisites are met. At the end of the lease period, the homeowner may purchase the system, renew the lease agreement, or get the panels removed.

# India's Solar Capacity in various sectors

**Total installed capacity: 5,953 MW**  
(As on 30 June 2020)

		Public sector	
Commercial	1,292	3,080	776
Industrial			804
Residential			
OPEX		4,102	
CAPEX		1,851	

All figures in MW  
Source: Bridge to India

# SOURA

## Subsidy Scheme

The Ministry of New and Renewable Energy (MNRE) aims to set up 38 GW of rooftop solar PV projects in the second phase of its ambitious grid-connected rooftop solar photovoltaic programme. In line with the phase II subsidy program of MNRE and with the approval of state government, KSEB initiates a subsidy program for the domestic consumers. In this subsidy initiative, KSEB introduced a special model (Kerala model) apart from the normal subsidy model. The Kerala model are based on the average consumption of the consumer and it aims to give financial support to the weaker section there by making them green energy partner of the state. Since Kerala has been allotted 50 MW under this scheme, the scheme will be closed once 75,000 applications are received.

### Model 1 (Kerala Model) & Model 2 (Normal Model Subsidy Model)

#### Model 1 | Kerala Model

Consumer pays only a part of the total implementation cost of the solar panel. The other part is borne by KSEBL. Consumer will be eligible for a part of the energy generated from the plant based on your investment. Based on your average monthly electricity consumption you can choose from the three options.

##### Features

##### Plant Capacity

Solar Power plant should be 2KWp or 3KWp

##### Maintenance

25 years maintenance of the plant will be done by KSEPL

##### Economical

The return on investment will always be twice the investment. See table below.

##### Options Available

Average Monthly consumption (units)	Consumer Contribution (% of cost)	Return (% of plant generation)
Up to 120	12% (Max INR 6200 per KWp)	25%
Up to 150	20% (Max INR 11,000 per KWp)	40%
Up to 200	25% (Max INR 14,000 per KWp)	50%

**Application fee: INR 1000 + GST**

##### Eligibility Criteria

All domestic consumers with average monthly consumption up to 200 units are eligible for this project.

#### Model 2 | Normal Subsidy Model

If consumer wishes to install the plant investing the whole amount less subsidy, they can choose this option. The consumer will be eligible to use entire energy generation from the solar plant. Consumer can claim up to 40 % of the plant cost as subsidy based on the solar plant capacity.

##### Features

##### Plant Capacity

Solar Power plant should be 2KWp

##### Maintenance

5 years maintenance of the plant will be done by KSEPL

##### Economical

Consumer can claim up to 40 % of the plant cost as subsidy based on the solar plant capacity.

##### Options Available

Plant Capacity (in KWp)	Subsidy (% of cost)
Up to 3KWp	40%
4KWp to 10KWp	40% for first 3 KWp 20% for each additional KWp
Above 10 KWP	26% for 10 KWp) & NIL for rest

**Application fee: INR 1000 + GST**

##### Eligibility Criteria

All domestic consumers are eligible for this project.

List of rooftop solar installation companies in India

Orb Energy  
Vikram Solar  
Renew Power

Loom Solar  
Tata Power  
Solar  
Mahindra  
Susten

Sunsure Energy  
Fourth Partner  
Energy  
Surya day

SB Energy  
CleanMax Solar  
Harsha-Abakus  
Solar

# MNRE Subsidy under the Phase II of rooftop solar program

- **Phase I of rooftop capacity deployment had a target of 4200 MW by FY 20 and budget outlay of 5000 Crore**
  - SNA were identified as implementing agencies
  - Had limited success
  - CFA was available for residential and government sector/PSUs
- **Phase-II**
  - Announced in August 2019
  - DISCOMs made the implementing agencies
  - DISCOMs to submit proposal to MNRE for implementation
  - Incentives to the DISCOM, if the installations in financial year are more than 10% of the base year.
  - DISCOMs encouraged to develop utility-led business models for deployment
  - Subsidy available only to residential consumers

## Rooftop deployment framework in States

- **Enabling policy framework for solar rooftop**
  - Single window clearance portals
  - Incentives to encourage consumers
  - Net metering regulation framed
  - Rooftop targets defined for states
  - Notified Solar Policy in states
  - Process defined for feasibility check and approvals

